REMARKS

Claims 1-27 are pending in the present application. Claims 1, 3, 8, 9, 14, 16, 23 and 24 have been amended, leaving Claims 1-27 for consideration upon entry of the present amendment.

Support the amendment of "nanostructured" to "nanostructured particles" in Claims 8, 14 and 23 can be found in the Specification on Page 1, line 13 to Page 2, line 4.

Claim 1 has been amended merely to correct a typographical error. Claims 3, 9, 14, 16, 23 and 24 have been amended to cure the rejections of the claims under 35 U.S.C. §112, second paragraph as explained in detail below. These amendments merely more definitely claims the present invention and do not narrow the scope thereof.

No new matter has been introduced by these amendments. Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

1. Claim Rejections Under the Judicially Created Doctrine of Obviousness-Type Double Patenting

Claims 1-27 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over Claims 1-41 of U.S. Patent No. 6,214,309. A Terminal Disclaimer was submitted on June 28, 2002.

2. Claim Rejections Under 35 U.S.C. §112, second paragraph

Claims 1-27 stand rejected under 35 U.S.C. §112, second paragraph as being indefinite for failing to point out and distinctly claim the subject matter which the Applicants' regard as the invention. In particular the Examiner alleges that the use of the term "high energy" in Claims 1, 4, 9, 16, and 23 is indefinite because the term is subjective and unclear. Applicants disagree.

Applicants maintain that high-energy ball milling is a known term of art in the Mechanical Alloying field. As further support for this statement, Applicants refer the Examiner to U.S. Patent No. 5,773,922 to Lee et al., filed on Nov. 30, 1995. For the Examiner's convenience, a copy of U.S. Patent No. 5,773,922 is attached hereto. As described in Lee et al., high-energy ball milling is performed when "the ball mill is operated at a relatively higher rotating speed of 300-700 rpm for 10-50 hours" (Column 3, lines 22-26). Further, high-energy ball milling is an element of Claim 1of Lee et al. Thus, high-energy ball milling is a term of art referring to ball milling performed at speeds of over 300 rpm. Because high-energy ball milling is a term well known to those of ordinary skill in the art as evidenced at least in Lee et al., the term is both definite and clear.

The Examiner has rejected Claims 3 and 24, apparently because the Examiner believes that the word "mixture" should replace "combination". In order to expedite prosecution, "combination" has been amended to "mixture" in Claims 3 and 24.

The Examiner has rejected Claims 8, 14, and 23 by stating " 'nanostructured' is unclear as to whether crystallite size is meant" (Paper 12, page 2). Claims 8, 12 and 23 have been amended to recite nanostructured particles to expedite prosecution. The term

"nanostructured particles" is defined beginning on page 1, line 13 to page 2, line 4 of the application as filed and as such is definite.

Claim 9 has been rejected due to the phrase "metal precursor". Applicants have amended the claim to read "carbon source" as suggested by the Examiner.

In view of the foregoing amendments and remarks withdrawal of the rejection of Claims 1-27 under 35 U.S.C.§112 and allowance of said claims is respectfully requested.

3. Claim Rejections Under 35 U.S.C. §103(a)

Claims 1, 2 and 4-7 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,651,950 to Lee et al. (hereinafter "Lee") taken with U.S. Patent No. 5,030,286 to Crawford et al. (hereinafter "Crawford"). Applicants respectfully traverse the rejection.

The present Claims are directed to a method for the synthesis of carbide cermet powders comprising high-energy ball milling a mixture of carbide cermet precursor powders and a carbon source to form an as-milled powder, and annealing the as-milled powder to form a carbide cermet powder.

Lee discloses that the mesophase of coal-tar pitch is highly reactive and can be used a catalyst to produce silicon carbide. (Col.1, lines 49-62 and Col. 2, line 52-53). Lee does not teach a method of making a cermet, but rather a method of making silicon carbide. While silicon carbide can be part of a cermet, a cermet must have a ductile metal phase in addition to a hard ceramic phase such as a carbide.

Crawford is directed to silica slurries and methods of making them. Crawford at least does not teach or suggest the production of a cermet. Further, the process described in Crawford is shear milling (Column 5, lines 57-60) and not ball milling as presently claimed.

The Examiner has asserted that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the milling of Crawford in the process of Lee "because doing so makes the small particles desired." (Paper 7, page 3) Applicants disagree with the Examiner's assertion of obviousness.

As is well-known to those of skill in the art, a cermet is a composite material made of a hard ceramic phase such as silicon carbide combined with small amounts of a ductile metal such as cobalt. Lee is directed to methods of making silicon carbide, and Crawford is directed to the production of silica slurries. Applicants submit that neither Lee nor Crawford discloses the production of a cermet and thus there is at least one element of the present claims that is not taught by the references. If one were to properly combine Lee and Crawford, one would obtain silicon carbide and not a cermet.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicants assert that the Examiner has failed to establish a prima facie case of obviousness because neither Lee nor Crawford teaches a method of making a cermet. Reconsideration and withdrawal of the rejection is respectfully requested.

Claims 3 and 8 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Lee taken with Crawford and further in view of U.S. Patent No. 4,742,029 to Kurachi et al. (hereinafter "Kurachi"). The combination of Lee and Crawford was discussed above. Kurachi has been cited for its teaching with regard to carbon sources and does not teach or suggest method of making a cermet. Because Kurachi does not teach methods of forming a cermet, Kurachi fails to cure the defects of Lee and Crawford. Reconsideration and withdrawal of the rejections under 35 U.S.C. § 103(a) are requested.

4. Claim Rejections Under 35 U.S.C. §102(e)

Claims 1-5, 7-14, 16-21, and 23-26 stand rejected under 35 U.S.C. §102(e) as being anticipated by or, in the alternative under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 5,746,803 to Dunmead et al. (hereinafter "Dunmead"). Applicants respectfully traverse the rejection.

Dunmead discloses a method of forming a transition metal carbide-Group VIII metal powder comprising heating an admixture of a particulate precursor, Group VIII metal powder source and a finishing source of carbon to a temperature of about 1173K to about 1773K (Abstract). The particulate precursor comprises a metal containing tungsten and a precursor carbide of a transition metal (Dunmead, Claim 1).

In making the rejection, the Examiner states "Dunmead teaches in column 7 and ex. 1 ball-milling carbon black and metal oxide" (Paper 12, Page 3). The Examiner further states "[w]hile not explicitly teaching 'high energy', the 50 rpm recited appears to be 'high'" (Paper 12, Page 3).

As explained in detail above, high-energy ball milling is a term of art referring to ball milling at a speed of greater than 300 rpm. Thus, the 50 rpm milling of Dunmead would not be understood by one of ordinary skill in the art as high-energy ball milling.

To anticipate a claim under 35 U.S.C. § 102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988). For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In Re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A. 1970).

Applicants believe the Dunmead et al. does not provide an adequate basis for a rejection under 35 U.S.C §102(e) or 35 U.S.C. §103(a) because Dunmead et al. does not contain all the elements of the pending claims, high-energy ball milling in particular.

For at least these reasons, Dunmead does not render the present claims obvious. For at least these reasons, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102(e) and 35 U.S.C. § 103(a) are requested.

Claims 1, 2, 4, 8-10,and 14 stand rejected under 35 U.S.C. §102(e) as being anticipated by El-Eskandarandy et al., Metallurgical and Materials Transactions 27A, 4210, 1996 (hereinafter "El-Eskandarandy"). Applicants respectfully traverse the rejection.

El-Eskandarandy discloses a method of making tungsten carbide by solid-state high-energy ball milling WO_3, Mg and C powders (Page 4210, Column 2). The Mg functions as a

reducing agent in the production of tungsten carbide and is converted to MgO_2 which is leached out during the process to leave the desired tungsten carbide (Page 4211, Column 1, lines 6-15). El-Eskandarandy does not disclose the formation of a cermet, but rather a carbide powder.

In making the rejection, the Examiner states "The reference teaches on pg. 4210 high energy milling carbon, W oxide and an extra metal, then leaching/washing then annealing. N[o] []differences are seen in the product made" (Paper 12, Page 3).

As discussed in detail above, the present claims are directed to a method of making a cermet. Also as discussed above, to anticipate a claim, a reference must have all of the elements arranged as in the claim. Because El-Eskandarandy teaches a method of forming tungsten carbide and not a cermet, El-Eskandarandy does not teach the presently claimed product. While an "extra metal" is used in the method, this metal is present as a reactant in the formation of tungsten carbide and is oxidized to MgO_2 which is leached out from the tungsten carbide powder produced in the reaction. Applicants further submit that El-Eskandarandy does not render the present claims obvious, because El-Eskandarandy does not disclose the formation of a cermet. For at least the foregoing reasons, reconsideration and withdrawal of the rejection under 35 U.S.C. § 102(e) are requested.

It is believed that the foregoing amendments and remarks fully comply with the Office Action and that the claims herein should now be allowable to Applicants. Accordingly, reconsideration and allowance is requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by the Applicants' Attorney.

Respectfully submitted,

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Marked-Up versions of the amendments

A marked-up version of Claims 1, 3, 8, 9, 14, 16, 23 and 24 follows:

1. (Amended/Marked-Up) A method for the synthesis of carbide cermet powders, comprising

high-energy ball milling ~~a mixture of~~ a mixture of carbide cermet precursor powders and a carbon source to form an as-milled powder; and

annealing the as-milled powder to form a carbide cermet powder.

3. (Amended/Marked-Up) The method of claim 1, wherein the carbon source is graphite, coal, thermal black, acetylene black, coke, or a mixture~~combination~~ thereof.

8. (Amended/Marked-Up) The method of claim 1, wherein the carbide cermet powder comprises~~is~~ nanostructured particles.

9. (Twice Amended/ Marked-Up) A method for the synthesis of micron- or submicron-sized, carbide cermet powders, comprising

high-energy ball milling a mixture of a carbon source~~precursor~~, at least one of a precursor of SiC, TiC, VC, HfC, ThC_2, ThC, Cr_3C_2 WC, W_2C, ZrC, TaC, Ta_2C, or NbC, and a metal source to form a milled powder; and

annealing the milled powder to form micron- or submicron-sized, carbide cermet powders.

14. (Amended/Marked-Up) The method of claim 9, wherein the carbide cermet powder comprises~~is~~ nanostructured particles.

16. (Amended/Marked-Up) A method for the synthesis of micron- or submicron-sized tungsten carbide powders, comprising

high-energy ball milling a mixture of a tungsten precursor~~source~~, a carbon source~~precursor~~, and a cobalt precursor~~source~~ to form ~~an~~ milled powder; and

annealing the milled powder to form micron- or submicron-sized tungsten carbide cobalt powders.

23. (Amended/Marked-Up) A method for the synthesis of micron- or submicron-sized, nanostructured tungsten carbide cobalt powders, comprising

high-energy ball milling a mixture of a tungsten precursor, a carbon source, and a cobalt precursor to form an as-milled powder; and

annealing the as-milled powder at a temperature from about 700 °C to about 1300 °C, thereby forming micron- or submicron-sized, ~~nanostructured~~ tungsten carbide cobalt powders comprising nanostructured particles.

24. (Amended/Marked-Up) The method of claim 23, wherein the carbon source is graphite, coal~~,~~, thermal black, acetylene black, coke, or a mixture~~combination~~ thereof.